CLAIMS

What is claimed is:

1. A power amplifier module operable over a range of output power levels, comprising an output transistor having an input coupled to an input node of the power amplifier module and an output coupled to an output node of the power amplifier module, the power amplifier module further comprising circuitry for automatically compensating a load line of the output transistor for impedance variations appearing at the output node, the circuitry comprising detection circuitry for generating a first detection signal having a value that is indicative of the current flowing through the output transistor and a second detection signal having a value that is indicative of the voltage appearing at the output of the output transistor, and further comprising compensation circuitry for controlling the generation of a plurality of power amplifier bias current and bias voltage signals to have values that are a function of the values of the first and second detection signals, and the current output power level of the power amplifier module.

2. A power amplifier module as in claim 1, further comprising an impedance matching circuit coupled between the output of the output transistor and the output node, the impedance matching circuit presenting a variable impedance that is controlled by an output signal from the compensation circuitry.

3. A power amplifier module as in claim 2, where the output signal from the compensation circuitry is generated to have a value that is a function of the value of the first detection signal and the current output power level.

4. A power amplifier module as in claim 2, where the output signal from the compensation circuitry is generated when the current output power level exceeds a predetermined output power level.

5. A power amplifier module as in claim 1, where the compensation circuitry makes a change to at least one of the plurality of power amplifier bias current and bias voltage signals when the current output power level exceeds a predetermined output power level.

6. A power amplifier module as in claim 2, where the compensation circuitry makes a change to at least one of the plurality of power amplifier bias current and bias voltage signals when the current output power level exceeds a first predetermined output power level, and where the output signal from the compensation circuitry to the impedance matching circuit is generated when the current output power level exceeds a second predetermined output power level that is greater than the first predetermined output power level.

7. A power amplifier module as in claim 1, where the compensation circuitry controls the generation of the power amplifier bias current signal as a function of a value of the first detection signal and a value of a signal that is indicative of the current output power level, and controls the generation of the power amplifier bias voltage signal as a function of a value of the second detection signal and the value of the signal that is indicative of the current output power level.

8. A power amplifier module as in claim 1, where the detection circuitry comprises a current mirror in parallel with the output transistor for generating the first detection signal, and a rectifier coupled to the output of the output transistor for generating the second detection signal.

9. A method to operate a power amplifier module over a range of output power levels, comprising:

generating a first detection signal having a value that is indicative of current flowing through an output transistor and a second detection signal having a value that is indicative of a voltage appearing at an output of the output transistor; and

automatically compensating a load line of the output transistor for impedance variations appearing at an output node of the power amplifier module by controlling the generation of a plurality of power amplifier bias current and bias voltage signals to have values that are a function of the values of the first and second detection signals, and the current output power level of the power amplifier module.

10. A method as in claim 9, further comprising controlling, with an output signal from

the compensation circuitry, a value of an impedance matching circuit coupled between the output of the power transistor and the output node.

11. A method as in claim 10, further comprising generating the output signal from the compensation circuitry to have a value that is a function of the value of the first detection signal and the current output power level.

12. A method as in claim 10, further comprising comparing the current output power level to a predetermined output power level; and generating the output signal from the compensation circuitry only if the current output power level exceeds the predetermined output power level.

13. A method as in claim 9, further comprising comparing the current output power level to a predetermined output power level; and changing at least one of the plurality of power amplifier bias current and bias voltage signals if the current output power level exceeds the predetermined output power level.

14. A method as in claim 10, further comprising comparing the current output power level to a first predetermined output power level; changing at least one of the plurality of power amplifier bias current and bias voltage signals if the current output power level exceeds the first predetermined output power level; comparing the current output power level to a second predetermined output power level; and generating the output signal from the compensation circuitry if the current output power level exceeds the second predetermined output power level, where the second predetermined output power level is greater than the first predetermined output power level.

15. A method as in claim 9, where generating the power amplifier bias current signal comprises comparing the first detection signal to a signal having a value that is indicative of the current output power level, and where generating the power amplifier bias voltage signal comprises comparing the second detection signal to the signal having the value that is indicative of the current output power level.

16. A method as in claim 10, where generating the first detection signal comprises mirroring the current flowing in the output transistor, and where generating the second

detection signal comprises rectifying a signal appearing at the output of the output transistor.

17. A radio frequency (RF) power amplifier module operable over a range of output power levels, comprising an output transistor having an input coupled to an input node of the power amplifier module for receiving a wideband code division, multiple access signal to be transmitted from an antenna and an output coupled to an output node of the RF power amplifier module, the RF power amplifier module further comprising circuitry for automatically compensating the output transistor for impedance variations appearing at the output node due at least in part to a change in an RF propagation environment of the antenna, the circuitry comprising detection circuitry for generating a first detection signal having a value that is indicative of the current flowing through the output transistor and a second detection signal having a value that is indicative the voltage appearing at the output of the output transistor, and further comprising compensation circuitry for controlling the generation of a plurality of power amplifier bias current and bias voltage signals to have values that are a function of the values of the first and second detection signals, respectively, and the value of a signal that is indicative of a current output power level of the RF power amplifier module, further comprising an impedance matching circuit coupled between the output of the output transistor and the output node, the impedance matching circuit presenting a variable impedance that is controlled by an output signal from the compensation circuitry, where the output signal from the compensation circuitry is generated to have a value that is a function of the value of the first detection signal and the value of the signal that is indicative of the current output power level of the RF power amplifier module.

18. The RF power amplifier module as in claim 17, where the compensation circuitry makes a change to at least one of the plurality of power amplifier bias current and bias voltage signals if the current output power level exceeds a first predetermined output power level, and where the output signal from the compensation circuitry is generated only if the current output power level exceeds a second predetermined output power level that is greater than the first predetermined output power level.

19. The RF power amplifier module as in claim 17, where the detection circuitry comprises a current mirror in parallel with the output transistor for generating the first

detection signal and a rectifier coupled to the output of the output transistor for generating the second detection signal.

20. A radio frequency (RF) power amplifier contained within a package, the RF power amplifier being operable over a range of output power levels specified by a value of a power control signal that is one of applied to a first input of the package and generated internally to the package, the RF power amplifier comprising at least one output transistor having an input coupled to second input of the package for receiving an input RF signal and an output coupled to an output of the package for outputting an amplified RF signal, the RF power amplifier further comprising circuitry integrated with the at least one output transistor for automatically compensating the RF amplifier for impedance variations appearing at the first output, the circuitry comprising detection circuitry for generating detection signals indicative of current flowing through the at least one output transistor and of a voltage appearing at the output of the at least one output transistor, and further comprising load line compensation circuitry responsive to the detection signals and to the power control signal for maintaining a desired output linearity of the amplified RF signal.

21. A mobile radiocommunication terminal comprising an antenna and, coupled to the antenna, a radio frequency (RF) power amplifier module that is operable over a range of output power levels, said RF power amplifier module comprising at least one output transistor having an input coupled to an input node of the power amplifier module for receiving a signal to be transmitted from the antenna and an output coupled to an output node of the RF power amplifier module, the RF power amplifier module further comprising circuitry for automatic compensation of the output transistor for impedance variations appearing at the output node due at least in part to variations in an environment of the antenna, the automatic compensation circuitry comprising detection circuitry for generating a first detection signal having a value that is indicative of the current flowing through the at least one output transistor and a second detection signal having a value that is indicative the voltage appearing at the output of the at least one output transistor, and further comprising bias control circuitry for controlling the generation of a plurality of power amplifier bias current and bias voltage signals to have values that are a function of the values of the first and second detection signals, respectively, and also the value of a signal that is indicative of a current output power

level of the RF power amplifier module, further comprising an impedance matching circuit coupled between the output of the at least one output transistor and the output node, the impedance matching circuit presenting a variable impedance that is controlled by an output signal from the automatic compensation circuitry, where the output signal from the automatic compensation circuitry is generated to have a value that is a function of the value of the first detection signal and the value of the signal that is indicative of the current output power level of the RF power amplifier module.

22. The mobile radiocommunication terminal as in claim 21, where the automatic compensation circuitry makes a change to at least one of the plurality of power amplifier bias current and bias voltage signals if the current output power level exceeds a first predetermined output power level, and where the output signal to the impedance matching circuit is generated if the current output power level exceeds a second predetermined output power level that is greater than the first predetermined output power level.

23. The mobile radiocommunication terminal as in claim 21, where the detection circuitry comprises a current mirror in parallel with the at least one output transistor for generating the first detection signal.

24. The mobile radiocommunication terminal as in claim 21, where the detection circuitry comprises a rectifier coupled to the output of the at least one output transistor for generating the second detection signal.

25. The mobile radiocommunication terminal as in claim 21, where a signal transmitted from said antenna comprises a wideband code division, multiple access signal.